What is claimed is:

1. A method of evaluating the transmission of a property within a subsurface geologic reservoir, comprising:

a) providing a set of vertices representative of at least a portion of said reservoir;

b) providing a plurality of edges, said edges representing property transmission paths between connected vertices within said set of vertices;

c) associating with each edge a cost representative of the ability of said property to be transmitted across said edge from one vertex to another vertex within said set of vertices;

d) selecting at least one source vertex from within said set of vertices; and

e) determining an extremum path between said source vertex and each of at least two destination vertices that minimizes or maximizes a summed cost across the one or more edges included in said extremum path using a graph-theory single-source shortest-paths algorithm.

2. A method according to Claim 1, wherein said single-source shortest-paths algorithm is based upon Dijkstra's single-source shortest-paths algorithm.

3. A method according to Claim 2, wherein said subsurface geologic reservoir contains a fluid and said property is a property of said fluid, said subsurface geologic reservoir, or a combination thereof.

4. A method according to Claim 3, wherein said cost is selected from a measure representative of resistance to fluid flow.

5. A method according to Claim 3, wherein said cost is selected from a value calculated from transmissibility, phase potential difference and phase mobility.

6. A method according to Claim 5, wherein said cost is the reciprocal of transmissibility.

7. A method according to Claim 5, wherein said cost is the reciprocal of [transmissibility multiplied by phase mobility].

8. A method according to Claim 2, wherein said step of providing a set of vertices includes providing a set of cells and translating said cells into vertices.

9. A method according to Claim 8, wherein said step of providing a plurality of edges includes providing a plurality of connections and translating said connections into edges.

10. A method according to Claim 9, wherein said steps of providing a set of vertices and providing a plurality of edges further includes discretizing a subsurface geologic reservoir into said cells and said connections.

11. A method according to Claim 10, wherein said cells are part of a 3D geologic model.

12. A method according to Claim 9, wherein said translating said connections into edges includes comparing said connections with a criterion and forming edges from only those connections which meet said criterion.

13. A method according to Claim 3, further comprising displaying at least one of said extremum paths, at least one vertex, or at least one edge on a graphical device.

14. A method according to Claim 13, wherein said graphical device comprises a 3D viewer.

15. A method according to Claim 3 , wherein said set of vertices includes reservoir vertices and well vertices.

16. A method according to Claim 3, further including associating with each vertex on said each extremum path the identity of the predecessor vertex or the predecessor edge on said extremum path.

17. A method according to Claim16, further including associating with each vertex on each said extremum path the cost of the predecessor edge connected to said vertex on said extremum path.

18. A method according to Claim15, wherein said at least one source vertex includes a plurality of source vertices and further including iterating steps (d) and (e) for each of said plurality of source vertices to determine a plurality of collections of source vertex extrema paths for each said source vertex to a plurality of destination vertices.

19. A method according to Claim 18 wherein said plurality of source vertices includes well vertices.

20. A method according to Claim19, further comprising selecting at least one reservoir vertex that is a destination vertex and determining the set of extrema paths from each source well vertex to said destination reservoir vertex.

21. A method according to Claim20, further comprising determining the most extreme extremum path of said set of extrema paths.

22. A method according to Claim19, further comprising selecting a first source well vertex from said plurality of source vertices and a second well vertex and determining the extremum path from said first source well vertex to said second well vertex.

23. A method according to Claim15, further including selecting an extremum path cost criterion, and determining a first destination vertex group comprising all destination vertices that are connected to said source vertex by extrema paths that meet said extremum path cost criterion.

24. A method according to Claim23, further including associating with each destination vertex within said first destination vertex group a value representative of the amount of a fluid contained within each said destination vertex and summing the total amount of fluid contained in said first destination vertex group.

25. A method according to Claim18, wherein said plurality of source vertices include vertices selected randomly and further including randomly selecting extrema paths from each of said randomly selected source vertices and displaying said randomly selected extrema paths on a 3D viewer.

26. A method according to Claim18, wherein said plurality of collections of source vertex extrema paths contains at least two different extrema paths that have at least one common vertex and further comprising segregating the extrema paths from said plurality of collections of source vertex extrema paths into two or more groups, each of said groups comprising only paths that have no common vertices.

27. A method according to Claim3, further including:

(f) sorting said plurality of source vertex extrema paths according to said paths' relative summed costs; and

(g) creating a display of said plurality of source vertex extrema paths' sorted relative summed costs.

28. A method according to Claim27, further including calculating the sample cumulative distribution function of path cost for said plurality of source vertex extrema paths and wherein said creating step (g) includes creating a display of said sample cumulative distribution function.

29. A method according to Claim 2, wherein said single-source, shortest-paths algorithm contains a priority queue, implemented using a recursive formulation.

30. A method according to Claim 2, wherein said single-source, shortest-paths algorithm contains a priority queue, implemented using an iterative formulation.

31. A method according to Claim 1, wherein said method is completed using a computer.

32. A computer-readable media tangibly embodying a program of instructions executable by a computer to evaluate the transmission of a property within a subsurface geologic reservoir, said program comprising the following steps:

a) reading a set of vertices representative of at least a portion of said reservoir;

b) reading a plurality of edges, said edges representing property transmission paths between connected vertices within said set of vertices;

c) associating with each edge a cost representative of the ability of said property to be transmitted across said edge from one vertex to another vertex within said set of vertices;

d) reading a first vertex from within said set of vertices; and

e) determining an extremum path between said first vertex and each of at least two other vertices that minimizes or maximizes the summed cost across the one or more edges included in said extremum path using a graph-theory single-source shortest-paths algorithm.

33. A computer-readable media tangibly embodying a program of instructions executable by a computer to evaluate the transmission of a property within a subsurface geologic reservoir, said program comprising steps according to any of Claims 1-31.

34. A method of evaluating the transmission of a property within a subsurface geologic reservoir, characterized by:

a) providing a set of vertices representative of at least a portion of said reservoir;

b) providing a plurality of edges, said edges representing property transmission paths between connected vertices within said set of vertices;

c) associating with each edge a cost representative of the ability of said property to be transmitted across said edge from one vertex to another vertex within said set of vertices;

d) selecting at least one source vertex from within said set of vertices; and

e) determining an extremum path between said source vertex and each of at least two destination vertices that minimizes or maximizes the summed

cost across the one or more edges included in said extremum path using a graph-theory single-source shortest-paths algorithm.

35. A method according to Claim34, wherein said single-source shortest-paths algorithm is based upon Dijkstra's single-source shortest-paths algorithm.

36. A method according to either of Claims 34 or 35, wherein said subsurface geologic reservoir contains a fluid and said property is a property of said fluid, said subsurface geologic reservoir, or a combination thereof.

37. A method according to any of Claims34-36, wherein said cost is selected from a measure representative of resistance to fluid flow.

38. A method according to any of Claims34-37, wherein said cost is selected from a value calculated from transmissibility, phase potential difference and phase mobility.

39. A method according to any of Claims34-38, wherein said cost is the reciprocal of transmissibility.

40. A method according to any of Claims34-39, wherein said cost is the reciprocal of [transmissibility multiplied by phase mobility].

41. A method according to any of Claims34-40, wherein said step of providing a set of vertices includes providing a set of cells and translating said cells into vertices.

42. A method according to any of Claims34-41, wherein said step of providing a plurality of edges includes providing a plurality of connections and translating said connections into edges.

43. A method according to Claim 41 or 42, wherein said steps of providing a set of vertices and providing a plurality of edges further includes discretizing a subsurface geologic reservoir into said cells and said connections.

44. A method according to Claim 41or43, wherein said cells are part of a 3D geologic model.

45. A method according to Claim 42 or44, wherein said translating said connections into edges includes comparing said connections with a criterion and forming edges from only those connections which meet said criterion.

46. A method according to any of Claims34-45, further comprising displaying at least one of said extremum paths, at least one vertex, or at least one edge on a graphical device.

47. A method according to Claim46, wherein said graphical device comprises a 3D viewer.

48. A method according to any of Claims 34-47, wherein said set of vertices includes reservoir vertices and well vertices.

49. A method according to any of Claims 34-48, further including associating with each vertex on each said extremum path the identity of the predecessor vertex or the predecessor edge on said extremum path.

50. A method according to any of Claims 34-49, further including associating with each vertex on each said extremum path the cost of the predecessor edge connected to said vertex on said extremum path.

51. A method according to any of Claims 34-50, wherein said at least one source vertex includes a plurality of source vertices and further including iterating steps (d) and (e) for each of said plurality of source vertices to determine a plurality of collections of source vertex extrema paths for each said source vertex to a plurality of destination vertices.

52. A method according to Claim 51 wherein said plurality of source vertices includes well vertices.

53. A method according to Claim 52, further comprising selecting at least one reservoir vertex that is a destination vertex and determining the set of extrema paths from each source well vertex to said destination reservoir vertex.

54. A method according to Claim 53, further comprising determining the most extreme extremum path of said set of extrema paths.

55. A method according to any of Claims 52-54, further comprising selecting a first source well vertex from said plurality of source vertices and a second well vertex and determining the extremum path from said first source well vertex to said second well vertex.

56. A method according to any of Claims 34-55, further including selecting an extremum path cost criterion, and determining a first destination vertex group comprising all destination vertices that are connected to said source vertex by extrema paths that meet said extremum path cost criterion.

57. A method according to Claim 56, further including associating with each destination vertex within said first destination vertex group a value representative of the amount of a fluid contained within each said destination vertex and summing the total amount of fluid contained in said first destination vertex group.

58. A method according to any of Claims 51-57, wherein said plurality of source vertices include vertices selected randomly and further including randomly selecting extrema paths from each of said randomly selected source vertices and displaying said randomly selected extrema paths on a 3D viewer.

59. A method according to any of Claims 51-58, wherein said plurality of collections of source vertex extrema paths contains at least two different extrema paths that have at least one common vertex and further comprising segregating the extrema paths from said plurality of collections of source vertex extrema paths into two or more groups, each of said groups comprising only paths that have no common vertices.

60. A method according to any of Claims 51-59, further including:

(f) sorting said plurality of source vertex extrema paths according to said paths' relative summed costs; and

(g) creating a display of said plurality of source vertex extrema paths' sorted relative summed costs.

61. A method according to Claim 60, further including calculating the sample cumulative distribution function of path cost for said plurality of source vertex extrema paths and wherein said creating step (g) includes creating a display of said sample cumulative distribution function.

62. A method according to Claim 35, wherein said single-source, shortest-paths algorithm contains a priority queue, implemented using a recursive formulation.

63. A method according to Claim 35, wherein said single-source, shortest-paths algorithm contains a priority queue, implemented using an iterative formulation.

64. A method according to any of Claims34-63, wherein said method is completed using a computer.

65. A computer-readable media tangibly embodying a program of instructions executable by a computer to evaluate the transmission of a property within a subsurface geologic reservoir, said program comprising steps according to any of Claims34-64.